

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): An elasto-plastic socket for a Land or Ball Grid Array (LGA/BGA) package, comprising:

an insulative board ~~having~~ defining one or more matrices of housing openings and a plurality of holes proximate to edges of the insulative board;

a plurality of metal contacts ~~fit~~ fitting in the housing openings on the insulative board;

a laminate bonding layer applied on the insulative board to fix the plurality of metal contacts; and

a plurality of alignment ~~means such as pins or spring clips fit into~~ members fitting in the plurality of holes on the insulative board for aligning the LGA/BGA package to the metal contacts.

Claim 2 (currently amended): The elasto-plastic socket of claim 1, wherein the metal contacts each comprise a top surface portion for ~~contact with~~ contacting a package ~~pads pad~~, a curved plate spring portion of different width connected to the top surface portion, a contact wall portion providing sliding contact with the curved plate spring portion and a PCB side contact portion, ~~and wherein the metal contacts are plated with gold and are stamped and formed from sheet metal stripes such as BeCu or other copper alloys.~~

Claim 3 (currently amended): The elasto-plastic socket of claim 2, wherein the ~~contact~~ top surface portion has a concave spherical surface for contacting a BGA package.

Claim 4 (currently amended): The elasto-plastic socket of claim 2 or claim 3, ~~wherein the PCB side contact portion is replaced by attaching~~ further comprising a solder ball attached to the PCB contact portion for surface mount on the PCB.

Claim 5 (currently amended): ~~The application of elasto-plasticity theory to the design of the metal contacts, as claimed in claims 1, 2, or 3, elasto-plastic socket of claim 2 or 3, wherein the metal contacts comprises~~ a ductile material is used to define the that defines an upper bound of ~~the a~~ contact force for each metal contact in the elasto-plastic socket because the curved plate spring portion is designed to lead loads to a plastic hardening stage and wherein the application will to induce to a uniform distribution of ~~the a~~ force supporting the a bottom of ~~[[a]]~~ the LGA/BGA package and allow large elasto-plastic deflection of the top surface portion of ~~the metal contacts~~ to accommodate all tolerances in a vertical direction.

Claim 6 (currently amended): ~~An improved semiconductor flip chip package comprising~~ The subsystem assembly of claim 12, wherein the L/BGA package comprises:

a package substrate;

a semiconductor chip mounted on the package substrate; and

a thin layer of heat spreader having a very high in-plane or isotropic thermal conductivity adhered to a top side of the semiconductor chip, the heat spreader spreading heat from hot spots ~~in junction layer~~ one the semiconductor chip.

Claim 7 (currently amended): ~~An elasto-plastic stiffener for an integrated circuit (IC) package using a Land/Ball Grid Array interconnect, the stiffener frame with single or multiple window openings for semiconductor chips or other electrical components comprising~~ The subsystem assembly of claim 13, wherein the elasto-plastic stiffener comprises:

a top plate;

a bottom plate having retaining means for retaining positioning of the stiffener to the IC package substrate; and

a serpentine shaped supporting structure sandwiched between the top and bottom plates, wherein the serpentine shaped supporting structure allows for large deformation in thickness of the stiffener while supporting desired pressure;

Claim 8 (currently amended): ~~The elasto-plastic stiffener subsystem assembly~~ of claim 7, wherein the stiffener is formed of a single piece or multiple pieces of sheet metal.

Claim 9 (currently amended): The ~~elasto-plastic stiffener subsystem assembly~~ of claim 7, wherein the serpentine shaped support structure is a wave shaped structure perpendicular to the top and the bottom plates.

Claim 10 (currently amended): The ~~elasto-plastic stiffener subsystem assembly~~ of claim 9, wherein the serpentine shaped support structure is slanted ~~toward inside~~ [[to]] toward the semiconductor of ~~an IC~~ the L/BGA package or leaned outside.

Claim 11 (currently amended): The ~~application of elasto-plasticity theory to the design of the stiffener as claimed in claims~~ subsystem assembly of claim 7, 8, 9, or 10, wherein the serpentine shaped supporting structure comprises a ductile material ~~is used to define the~~ that defines an upper bound of the ~~a~~ contact force of the stiffener and ~~wherein the application of the theory can make it possible to precisely define the~~ a pressure on the semiconductor chip.

Claim 12 (currently amended): An improved Land/Ball Grid Array (L/BGA) integrated circuit subsystem, comprising:

a bolster plate;

a printed circuit board (PCB);

a L/BGA socket mounted on the PCB, ~~or direct contact with the PCB pads;~~

a ~~Land or Ball Grid Array~~ L/BGA package aligned with the L/BGA socket;

a frame surrounding the L/BGA socket and package; [[.]]

~~a heat sink or a heat transfer device placed above the L/BGA package and the frame, wherein the PCB is sandwiched between the bolster plate and the frame using multiple screws or fasteners, and wherein the frame provides increased stiffness to the subsystem, and wherein the subsystem is secured with screws or fasteners through the heat sink or heat transfer device, the frame, the PCB and the bolster plate, such so that the top of the IC L/BGA package have tight contact with the bottom of heat sink heat transfer device.~~

Claim 13 (currently amended): The subsystem assembly of claim 12, wherein the further comprising an elasto-plastic stiffener of claim 7 is applied on top of the a package substrate of the L/BGA

package substrate to share the pressure from a semiconductor chip of the L/BGA package to the package substrate.

Claim 14 (currently amended): The subsystem of claim 13 wherein the ~~semiconductor chip~~ L/BGA package is selected from the group consisting of a lidded package with a small size lid [[or]] and a lidless package, ~~or the package of claim 6.~~

Claims 15 to 20 (canceled).

Claim 21 (new): The elasto-plastic socket of claim 1, wherein the alignment members is selected from the group consisting of pins or spring clips.

Claim 22 (new): The elasto-plastic socket of claim 2, wherein the metal contacts are plated with gold and are stamped and formed from sheet metal.

Claim 23 (new): The elasto-plastic socket of claim 22, wherein the sheet metal is selected from copper alloys including BeCu.

Claim 24 (new): The subsystem assembly of claim 12, wherein the fasteners are screws.

Claim 25 (new): The subsystem assembly of claim 12, wherein the heat transfer device is a heat sink.

Claim 26 (new): The subsystem assembly of claim 14, wherein the L/BGA package comprises:

the package substrate;

the semiconductor chip mounted on the substrate; and

a thin layer of heat spreader having a very high in-plane or isotropic thermal conductivity adhered to a top side of the semiconductor chip, the heat spreader spreading heat from hot spots on the semiconductor chip.